

1. Use the information to write the appropriate variation equation, and find y for the given values.

y varies directly as x and inversely as z . $y = \frac{3}{5}$ when $x = 2$ and $z = 5$. Find y when $x = 3$ and $z = 2$.

[A] $y = \frac{2x}{3z}; 1$

[B] $y = \frac{3z}{x}; 2$

[C] $y = \frac{3x}{2z}; \frac{9}{4}$

[D] $y = \frac{2z}{3x}; \frac{4}{9}$

2. Determine whether the function is a rational function. If so, find the domain and identify the horizontal and vertical asymptotes, and any holes in the graph. If the function is not rational, state why not.

$$f(x) = \frac{4x+9}{x^2-7x+10}$$

[A] rational; $x \neq -5$ or -2 ; asymptotes at $y = 0$, $x = -5$ and $x = -2$

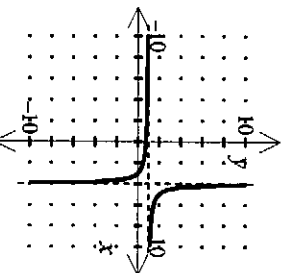
[B] rational; $x \neq 5$ or 2 ; asymptotes at $y = 0$, $x = 5$ and $x = 2$

[C] rational; $x \neq -\frac{9}{4}$ or 5 ; asymptotes at $y = 4$, $x = -\frac{9}{4}$ and $x = 5$

[D] not rational; numerator is of lower degree than denominator

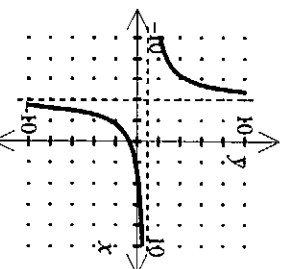
3. Which is the graph of the rational function $f(x) = \frac{x-3}{x-4}$? Identify the vertical and horizontal asymptotes.

[A]



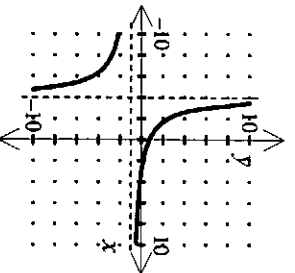
asymptotes: $y = 1$, $x = 4$

[B]



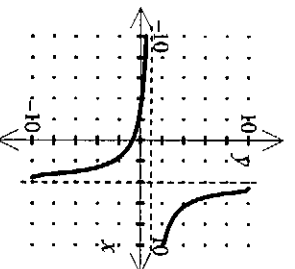
asymptotes: $y = 1$, $x = -4$

[C]



asymptotes: $y = -1$, $x = -4$

[D]



asymptotes: $y = 1$, $x = 4$

Simplify the rational expression.

4. $\frac{x^2+7x+12}{x^2-9} + \frac{x+4}{x-4}$

[A] $\frac{x+3}{x-4}$

[B] $\frac{7x+4}{3}$

[C] $\frac{x-4}{x-3}$

[D] $\frac{x-5}{x-3}$

Simplify the rational expression.

5. $\frac{x^2 - 36}{9x} \cdot \frac{10x}{x + 6}$

[A] $\frac{10(x+6)}{9}$

[B] $\frac{(x+6)^2(x-6)}{90x^2}$

[C] $\frac{(x-6)^2(x+6)}{90x^2}$

[D] $\frac{10(x-6)}{9}$

6. Simplify.

$\frac{x-3}{4x^2} - \frac{-2x+3}{9x} + \frac{7x}{24}$

[A] $\frac{21x^3 + 16x^2 + 42x - 54}{72x^2}$

[B] $\frac{21x^3 + 16x^2 - 6x - 54}{72x^2}$

[C] $\frac{10x-3}{12x^3}$

[D] $\frac{10x+3}{12x^3}$

7. Evaluate the radical expression: $\frac{1}{7}(\sqrt[3]{-125})^2$

[A] $\frac{25}{49}$

[B] $-\frac{5}{7}$

[C] $-\frac{5}{49}$

[D] $\frac{25}{7}$

8. Find the domain of the radical function.

$f(x) = \sqrt{6-x}$

[A] $x \leq 6$

[B] $x \leq -6$

[C] $x \geq 6$

[D] $x \geq -6$

9. Simplify the sum, difference, product, or quotient. Assume that the value of any variable is positive.

$\frac{\sqrt{30z^2}r}{\sqrt{5z}r}$

[A] $\sqrt{6z^2}$

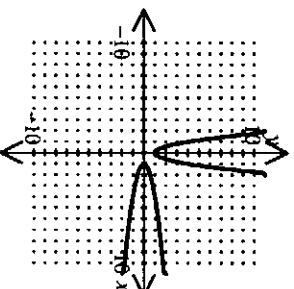
[B] $\frac{\sqrt{6}}{\sqrt{z}}$

[C] $\sqrt{6z}$

[D] $\sqrt{30z^2}r$

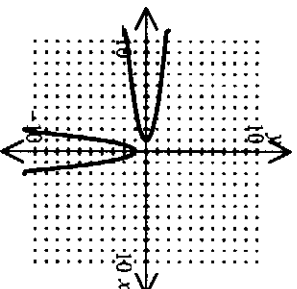
10. Which is the correct inverse of $y = 3x^2 + 1$ and the graph of both $y = 3x^2 + 1$ and its inverse on the same coordinate plane?

[A]



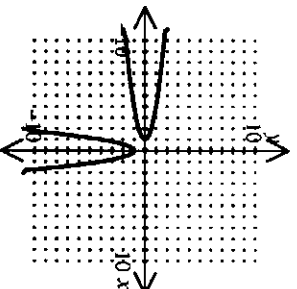
$y = \pm \sqrt{\frac{x-1}{3}}$

[B]



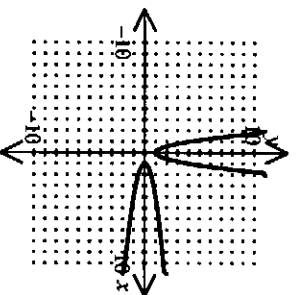
$y = \pm \frac{\sqrt{-(x+1)}}{3}$

[C]



$y = \pm \sqrt{\frac{-(x+1)}{3}}$

[D]



$$y = \pm \frac{\sqrt{x-1}}{3}$$

11. Rationalize the denominator.

[A] $\frac{\sqrt{7}}{2 + \sqrt{11}}$

[B] $\frac{2\sqrt{7} - \sqrt{77}}{7}$

[C] $\frac{11\sqrt{7} - \sqrt{14}}{119}$

[D] $\frac{7\sqrt{7} - \sqrt{22}}{38}$

[A] $\frac{15}{8}$

[B] $-\frac{7}{8}$

[C] $\frac{1}{8}$

[D] no solution

12. Solve the radical equation. If there is no real solution, write *no solution*.

$$3\sqrt{2x+4} - 4 = \sqrt{18x+16}$$

13. A population of 380 animals decreases at an annual rate of 19%. Find the multiplier for the rate of exponential decay.

[A] 0.81

[B] 1.19

[C] 0.19

[D] 1.81

14. Erosion gradually reduces the size of a small Pacific island that has a current area of just 400 acres. If the island's area decreases at an annual rate of 0.06%. Find the multiplier for the rate of exponential decay.

[A] 1.06

[B] 0.94

[C] 1.0006

[D] 0.9994

15. Find the final amount of the investment.
\$2000 at 6% interest compounded monthly for 5 years.

[A] \$2600.00

[B] \$2676.45

[C] \$2120.00

[D] \$2697.70

16. Solve the equation for x .

$$3 = \log_{11} x$$

[A] 33

[B] 14641

[C] 363

[D] 14642

17. Evaluate $8^{\log_8 2}$.

[A] 16

[B] 2

[C] 10

[D] 8

18. Write the expression as a single logarithm, and simplify if possible.

$$\log_c 5x + 3(\log_c x - \log_c y)$$

[A] $\log_c \frac{5x^4}{y^3}$

[B] $\log_c \frac{8x^2}{y}$

[C] $\log_c \frac{8x}{3y}$

[D] $\log_c \frac{15x^2}{y}$

19. Solve $\log_3(x+1) - \log_3(x-3) = \log_3 5$ for x .

[A] -2

[B] $\frac{1}{4}$

[C] 1

[D] 4

20. Solve the equation. Round your answers to the nearest hundredth.

$$9^x = 44$$

[A] 1.72

[B] 1.64

[C] 0.58

[D] 0.95

- Use a graph, synthetic division, substitution, and factoring to solve the equation.

21. $x^3 + 2x^2 - 48x = 0$

[A] 0, 8, -6

[B] 0, 8, 6

[C] 0, -8, -6

[D] 0, -8, 6

22. $x^3 + 7x^2 + 14x + 8 = 0$

[A] 2, -4, -2

[B] -1, -4, -2

[C] -2, -4, -2

[D] 1, -4, -2

23. Find the real zeros of the function. Give approximate values to the nearest hundredth, if necessary.

$$f(x) = x^3 + 4x^2 + 6x + 9$$

[A] -3

[B] 0, 1

[C] 0

[D] -3, 0

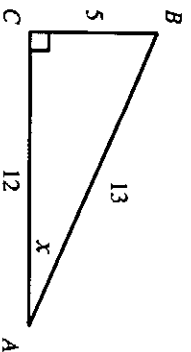
24. Find all the zeros of the polynomial function.

$$f(x) = x^2 - 6x + 18$$

- [A] $3 \pm 6i$ [B] $-3 \pm 3i$
 [C] $3 \pm 3i$ [D] $-3 \pm 6i$

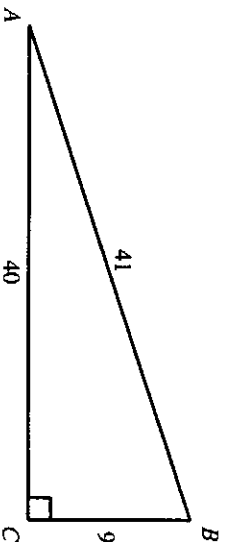
Refer to $\triangle ABC$ below to find the indicated value listed. Find the exact value and the value rounded to the nearest tenth, if necessary.

25. Find:
- $\tan X$



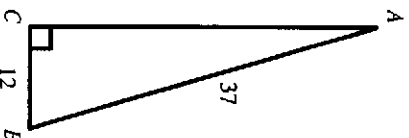
- [A] $\frac{5}{12}$ or 0.4167 [B] $\frac{12}{5}$ or 2.4
 [C] $\frac{12}{13}$ or 0.9231 [D] $\frac{5}{13}$ or 0.3846

26. Find:
- $\csc A$



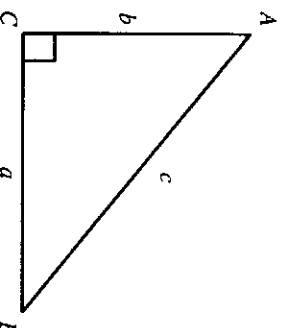
- [A] $\frac{41}{40}$ or 1.025 [B] $\frac{40}{41}$ or 0.9756
 [C] $\frac{9}{41}$ or 0.2195 [D] $\frac{41}{9}$ or 4.5556

27. For
- $\triangle ABC$
- , find the measure of
- $\angle A$
- to the nearest degree.



- [A] 19° [B] 71° [C] 43° [D] 9°

28. Use the following information to find the unknown sides and angles.
- $m\angle A = 24^\circ$
- ;
- $C = 13$



- [A] $b = 10.9$; $a = 6.7$; $m\angle B = 66^\circ$; $m\angle C = 90^\circ$
 [B] $b = 10.9$; $a = 5.3$; $m\angle B = 76^\circ$; $m\angle C = 90^\circ$
 [C] $b = 11.9$; $a = 6.7$; $m\angle B = 76^\circ$; $m\angle C = 90^\circ$
 [D] $b = 11.9$; $a = 5.3$; $m\angle B = 66^\circ$; $m\angle C = 90^\circ$

29. Convert
- 228°
- to radians.

- [A] $\frac{19}{30}\pi$ [B] $\frac{38}{45}\pi$ [C] $\frac{38}{15}\pi$ [D] $\frac{19}{15}\pi$

30. Convert
- $\frac{8}{5}\pi$
- to degrees.

- [A] 288° [B] 278° [C] 576° [D] 586°